

## Claims

What is claimed is:

1. An isolated nucleic acid molecule that encodes a polypeptide having starch synthase activity, said polypeptide comprising an N-terminal arm region, a C-terminal catalytic region and a region of about 900 amino acids terminating with said catalytic region,

wherein said C-terminal catalytic region has a catalytic domain comprising alpha-1,4-glycosyltransferase catalytic activity;

wherein a nucleic acid sequence encoding said region of about 900 amino acids terminating with said catalytic region has at least 75% homology with the region from about nt 2425 to about nt 5022 of SEQ ID NO:1; and

wherein said N-terminal arm region of said polypeptide comprises an amyloplast targeting peptide.

2. A vector comprising the nucleic acid molecule of claim 1.

3. The vector of claim 2, wherein said vector is an expression vector operably linked to elements that allow expression of said nucleic acid.

4. A host cell transfected with the vector of claim 3.

5. A transgenic plant comprising the vector of claim 3.

6. A method of producing starch, said method comprising the steps of: transforming a cell with the vector of claim 3; and extracting and purifying said starch.

7. A fusion construct, comprising the isolated nucleic acid molecule of claim 1 fused to nucleic acid encoding an affinity purification peptide.